ing matter from passing into solution), the Canton of Berne in September, 1879, issued an ordinance, fixing as an upper limit for potassium sulphate in wines so doctored, 2 grammes per litre. Various complaints then arose from merchants, who thought the regulation too stringent; and the Direction of Internal Affairs nominated a Commission, consisting of Herren Lichtheim, Luchsinger, and Nencki to study the subject afresh. In their report (*Journal für Prakt. Chem.*) they come to the conclusions (1) that the perniciousness of plastered wines even when they contain more than 2 gr. sulphate of potassium per litre, is far from being demonstrated indisputably. On the other hand it remains proved that wines strongly plastered have sometimes caused slight accidents, and it results from our theoretic study that the prolonged use of such a drink cannot be without prejudice to health; (2) that we therefore do not think it well to leave the trade in plastered wines without any control. While recognising the difficulty of fixing an absolute limit for plastering, they approve as sufficient that of the ordinance in question; on the one hand, it guarantees the public against illness from use of wines too much plastered, and on the other it is not a heavier fetter for the producer than similar prescriptions in France, where the interest in tolerance of plastered wines is vastly greater. Each buyer who has ordered a natural wine should have the right to refuse any wine containing more than 0·6 gr. neutral sulphate of potassium per litre. The reporters are unable to answer a question as to the action of plastered white wines on the system as compared with red.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. F. Logie Pirie; two Silver Pheasants (*Euplocamus nycthemerus*) from China, presented by Mrs. Hames; a Peregrine Falcon (*Falco peregrinus*), European, presented by Col. A. Brooksbank; a Peregrine Falcon (*Falco peregrinus*) captured at sea off Ceylon, presented by Mr. Tom Broune; six Common Kingfishers (*Alcedo ispida*), British, presented by Mr. T. A. A. Burnaby; two Slow-worms (*Anguis fragilis*), two Common Vipers (*Vipera berus*), British, presented by Mr. Charles Taylor; a Moustache Monkey (*Cercopithecus cephus*) from West Africa, two Common Ravens (*Corvus corax*), British, two Common Boas (*Boa constrictor*) from South America, deposited; two Shags or Green Cormorants (*Phalacrocorax cristatus*), European, purchased.

CLIMATE IN TOWN AND COUNTRY [1]

THE speaker began by describing the construction and uses of the instruments with which he had studied the conditions of climate, for many years past, in various parts of Europe. For the determination of sun temperature, he used a thermometer technically known as the blackened bulb *in vacuo* laid in full sunshine upon a sheet of white paper. The shade or air temperature was measured by an ordinary thermometer with a clear glass bulb and a scale engraved upon the stem. This thermometer was placed upon the same sheet of paper, and was shaded by a small white paper arch which admitted of a free circulation of air around the bulb.

He then explained the terms "sun temperature," "shade temperature," and "solar intensity." By shade temperature is meant the temperature of free air in full sunshine. Strictly it ought to be ascertained without any shade at all; for as soon as a shade is produced, conditions are introduced which often entirely baffle the object of the observer. The shade of a parasol has a different temperature from the shade of a tree, and this, again, differs widely from that of a house. The temperature of the shade of a sheet of tinfoil is quite different from that of a sheet of writing paper. Indeed it may be truly said that every shade has its own peculiar temperature. The following table shows the effect of the area of shade, and of the quality of the shading material:—

[1] Lecture delivered at the Royal Institution of Great Britain, February 10, 1882, by E. Frankland, Esq., D.C.L., F.R.S., M.R.I., Professor of Chemistry in the Normal School of Science, South Kensington Museum.

Beneath larch tree	19°·5 C.
,, white parasol	25·0
,, small white paper arch	35·0
,, small arch of bright tinfoil ...	45·2

Thus shade temperatures, measured during $1\frac{3}{4}$ hours of uninterrupted sunshine in the middle of the day, and within a few yards of the same spot, differed by no less than 25°·7 C. These observations were, however, made at Pontresina, 5,915 feet above the sea-level, and so wide a range does not occur at lower altitudes.

The most effective shading material is, obviously, that which most perfectly reflects solar heat; and of all materials with which he had experimented white paper was found to be the best, white linen and zinc-white being nearly equal to it. The most trustworthy shade thermometer, therefore, is one having its bulb covered with a thin layer of one of these materials; or the naked layer may be shaded by a small arch of white paper.

The term "sun temperature," as commonly employed, has a very vague meaning. If a body could be placed in sunlight under such circumstances as to absorb heat rays and emit none, its temperature would soon rise to that of the sun itself. But, as all good absorbers of heat are also good radiators, the elevation of temperature caused by the exposure of even good absorbers to sunlight is comparatively small. Thus an isolated thermometer, with blackened glass bulb, placed in sunshine, will rarely rise more than 10° C. above the temperature which it marks when screened from direct sunlight. Under these circumstances, however, the thermometer loses heat not merely by radiation, but also by actual contact with the surrounding cold air. If the latter source of loss be obviated, a much higher sun temperature is obtained. Thus, the blackened bulb enclosed in a vacuous clear glass globe will sometimes, when placed in sunlight, rise as much as 60° C. above the shade temperature, and a still higher degree of heat may be obtained by exposing to the sun's rays the naked blackened bulb of a thermometer enclosed in a wooden box padded with black cloth, and closed by a lid of clear plate glass. Thus he obtained with such a box, on the 22nd of December, in Switzerland, when the air was considerably below the freezing point, a temperature of 105° C., and a still higher temperature could doubtless be obtained by surrounding the thermometer with a vacuous globe before enclosing it in the padded box. These widely different temperatures, produced under different conditions by the solar rays, show that such observations can be comparative only when the thermometer employed to measure them is always surrounded by the same conditions. All the sun temperatures here mentioned were measured when the "blackened bulb *in vacuo*" was laid horizontally upon a sheet of white paper with its stem at right angles to the direction of the sun's rays.

"Solar intensity" is relative only, and means the number of degrees through which the sun raises the temperature of a blackened bulb *in vacuo* over the shade temperature. Hence the two temperatures must be observed simultaneously, which is a laborious operation when continued half-hourly throughout the day. By the use of a peculiar self-registering differential thermometer, however, which he had recently described to the Royal Society (*Proceedings* of the Royal Society, 1882, p. 331), the maximum solar intensity during the day is recorded by one reading only. The solar intensities commented upon in this discourse were ascertained by subtracting, in each case, the shade temperature from the sun temperature taken synchronously. The precautions necessary are described in the paper to the Royal Society just quoted.

The chief things affecting climate are the following:—(1) The sun. (2) Land and water—ocean and atmospheric currents. (3) Aspect—slope of ground, exposure or shelter. (4) Nature of surface. (5) Reflection from land and water. (6) Rain and clouds—suspended matter in the air. (7) Latitude—incidence of solar rays, thickness of air. (8) Presence or absence of aqueous vapour. Of these, the first three are obvious and require no comment. The remainder are less well known, but their importance demands our special attention.

Climate, or rather genial climate, is ultimately resolvable into two prime factors—sun-warmth and air-warmth. The amount of sun-warmth (assuming the sun's heat to be constant) depends upon two things only—length of day, and quantity of suspended matter and aqueous vapour in the air. The warmth of the air depends upon contact with matter heated by the sun's rays and upon the stoppage of radiation from the earth by aqueous vapour.

This heated matter is :—(1) Sea or land. (2) Suspended matter in the air—cloud, dust, smoke. (3) Aqueous vapour.

These two factors were first considered in their relation to

Country Climate

The feeling of warmth and comfort in the open air is produced either by direct solar radiation, even if the air be very cold; or by the warmth of the air itself. Upon both of these, the nature of the surface upon which the sunlight falls has a paramount influence, as is seen from the results of experiments on sun temperature recorded in the following table :—

Influence of Surface

Norway.	
Green grass	57·3° C.
Parched grass	61·2
Bare soil	60·6
Newly-mown grass	56·5
White paper	73·5
Hesse Cassel.	
Black caoutchouc	54·7° C.
Black silk	56·5
Plane glass mirror	64·0
Slightly concave metallic mirror	64·0
Green grass	58·5
White paper...	67·7
Switzerland. Mortaratsch Glacier.	
Black caoutchouc	39·0° C.
Bare white ice	47·5
White paper	53·0
Summit of Gornergrat.	
Dazzling white snow	59·0° C.
White paper	61·2
Pontresina.	
White paper...	66·2° C.
Grass	54·0
Grey rock	54·0
Black caoutchouc	56·4
Diavolezza.	
Black caoutchouc	39·1° C.
Snow...	61·9
White paper	65·8
Italy. Bellagio.	
Black caoutchouc	60·0° C.
Black merino	59·0
White linen	66·0
White paper	66.3

These results may be imitated with the powerful light from a Siemens' dynamo-machine. [Experiments shown.]

The warmth of the air over these surfaces was in the inverse order, caoutchouc heating the air most, white paper and snow least. The nearer the colour of the ground approaches to *white*, the more genial will be the climate from radiation and the cooler will be the air. The nearer it gets to *black*, the warmer will be the air and the less will temperature be due to radiation. Dark surfaces warm the air; light surfaces keep it cool, but warm the body by radiant reflection. The difference is substantially the same out of doors as that produced indoors by a close stove on the one hand, and an open fire on the other; but calm air is required for the enjoyment of radiant heat.

The sun's radiant heat may be greatly reinforced by reflection from surrounding objects. There are two kinds of reflectors; those which, like white paper, white linen, and whitewash, scatter the solar heat in all directions, and those which, mirror-like, reflect it in one direction only. To the former belong snow, chalk, light-coloured sand, and light-coloured earth; to the latter, water. The former are useful on whatever side they may be, the latter only when they are between the observer and the sun. The observations in the following table illustrate this effect of reflection from surrounding objects :—

Influence of Reflection from Surrounding Objects

From a white-washed wall. Pontresina.	
On white paper 10 feet from wall	38·7° C.
in adjoining meadow	27·7
From water. Top of cliff at Alum Bay, Isle of Wight.	
Direct and reflected rays	31·2° C.
Direct rays only	25·7
Zürich. One mile from Lake.	
Direct and reflected rays	34·0° C.
Direct rays only	31·5

M. Dufour has observed the same phenomenon on the lake of Geneva between Lausanne and Vevay. He has measured the proportions of direct and reflected heat at five different stations on the northern shore of the lake, and the results are condensed in the following table :—

Dufour's Observations

Altitude of Sun.	Proportion of direct to reflected heat.
3° 34′ to 4° 38′	100 : 68.
7°	100 : 40 to 50.
16°	100 : 20 to 30.

When the sun was higher than 30° the reflected heat was hardly perceptible. Hence this reflection is of the greatest value in winter, when it is most wanted, and it also tends to equalise temperature during the day; for in the early morning and evening, when the sun is low, and his direct heat is small, the reflected heat is greatest.

The bearing of these observations upon winter refuges for invalids is obvious. While the primary conditions to be secured must ever be fine weather and a sheltered position, the next in importance is, doubtless, exposure all day long to reflected, as well as direct, solar radiation. To realise this, a southern aspect and a considerable expanse of water or snow are necessary. and it is important that the sanitarium should be considerably and somewhat abruptly elevated above the reflecting surface, so that it may receive, throughout the entire day, the uninterrupted reflection of the sun's rays. At or near the sea-level, however, it is impossible, owing to solid and liquid matters floating in the lower regions of the atmosphere, to enjoy anything approaching to a uniform temperature from sunrise to sunset.

Although this suspended matter exists even at great altitudes, the bulk of it floats below 5,000 feet, and whilst only one-sixth of the atmosphere is below this height, there is probably much more than one-half of the suspended matter at a lower elevation. As might be expected, therefore, solar intensity is much greater at high than at low elevations, although the temperature of the air continually decreases as it is further removed from the earth's surface. The following tables contain observations illustrative of this point :—

Solar Intensity.

Station	Height of Barometer. Inch.	Sun's Altitude. °	Indicated Solar Intensity. °C.
Oatlands Park	29·9	60	41·5
Riffelberg	22·0	60	45·5
Hörnli	21·2	61	48·1
Gornergrat	20·5	61	47·0
Isle of Wight	30·0	58	42·3
Riffelberg	22·0	60	45·5
Piz Languard	20·2	54	45·8
Whitby	30·1	50	37·8
Pontresina	24·0	49	44·0
Bernina Hospitz...	22·6	51	46·4
Diavolezza	20·8	50	59·5
Bellagio	29·3	47	39·8
Shiahorn	21·6	46	43·5
Schwarzhorn	20·3	46	45·5

SHADE TEMPERATURES AT NOON AND DIFFERENT ALTITUDES

Station.	Height above Sea. Inch.	Sun's Altitude. °	Temperature. °C.
Oatlands Park	150	60	30·0
Riffelberg	8,428	60	24·5
Hörnli	9,491	61	20·1
Gornergrat	10,289	61	14·2
Whitby	60	50	32·2
Aak, Romsdal	20	49	36·2
Pontresina	5,915	49	26·5
Bernina Hospitz	7,644	51	19·1
Diavolezza	9,767	50	6·0
Bellagio	700	47	28·5
Shiahorn	8,924	46	23·0
Schwarzhorn	10,338	46	20·5

Hence it follows that the difference of solar intensity between noon and sunrise and sunset respectively is less at great than at small elevations, a deduction which is substantiated by the experimental data contained in the following table:—

VARIATION OF SOLAR INTENSITY AT DIFFERENT HOURS.

Station.	Time.	Solar Intensity. °C.	Difference. °C
Isle of Wight	Noon	42·3	7·6
,, ,,	3·30 P.M.	34·7	
,, ,,	Noon	42·1	8·5
,, ,,	3.15 P.M.	33·6	
,, ,,	Noon	41.7	8·4
,, ,,	3.50 P.M.	33·3	
At Sea	8.30 A.M.	33·8	7·9
,,	Noon	41·7	
Riffelberg (8,428 ft.)	8.20 A.M.	40·9	4·6
,, ,,	Noon	45·5	
Gornergrat (10,289 ft.)	,,	47 0	5·3
,, ,,	3 P.M.	41·7	

Similar testimony is also afforded by a comparison of early and late observations at widely different altitudes:—

VARIATIONS OF SOLAR INTENSITY AT DIFFERENT ALTITUDES

Station	Time. A.M.	Sun's Altitude at Noon.	Height above Sea. Feet.	Solar Intensity. °C.	Difference °C.
At Sea	7·35	72	0	28·6	8·6
Riffelberg	7·45	60	8,428	37·2	
At Sea	8·8	72	0	30·3	10·6
Riffelberg	8.20	60	8,428	49·2	

The sun's altitude was unfavourable for the comparison; nevertheless, there were here observed differences of 8·6° C. and 10·6°.

The farther we recede from the earth, the nearer we realise the conditions of solar radiation altogether outside the limits of the atmosphere, where the solar intensity (assuming the sun's emission to remain constant) is uniform from sunrise to sunset. Throughout the dreary winter days, when, even in the country, a leaden sky oppresses us, it is tantalising to reffect that, at the moderate height of 5,000 feet, which can be reached by a balloon in a few minutes, there is probably blue sky and brilliant sunshine.

Latitude profoundly, though irregularly, affects air temperature, for in high latitudes less solar heat falls upon each square foot of the earth's surface, and therefore the air resting upon that surface is warmed to less extent. But obliquity of the sun's rays has no such influence on solar intensity, for the highest readings of solar heat at or near sea-level have been observed near to the Arctic circle, as is seen from the following table:—

SOLAR INTENSITY IN DIFFERENT LATITUDES.

Station.	Latitude. °	Sun's Altitude. °	Sun Temperature. °C.	Solar Intensity. °C.
At Sea	0	84	78·9	41·7
Oatlands Park	52 N.	61	75·0	45·0
Isle of Wight	51 ,,	58	72·3	42·3
At Sea	23 ,,	56	71·7	45·0
Cassel	51 ,,	53	68·7	—
Tosten Vierod	59 ,,	52	73·5	—
Whitby	54 ,,	50	67·8	36·8
Aak, Romsdal	63 ,,	49	82·5	48·7
At Sea	30 ,,	48	70·3	43·6
Bellagio	45 ,,	47	68·3	39·8

These results show that, with an obliquity of only 6°, the sun temperature and solar intensity were respectively only 78·9° and 48·7° C.; whilst with an obliquity of 41°, there were 82·5° and 48·7° C. *On the equator at noon, with a nearly vertical sun, the solar intensity was actually 7° C. lower than in Romsdal, only 4° S. of the Arctic circle.* On the other hand, air warmth diminishes, as a rule, with increase of latitude, although, as the following table shows, there are some remarkable exceptions, for it was 1° higher in lat. 52° N. with an obliquity of 29°, than in lat. 5° N. with an obliquity of only 12°, and in the high latitude 63°, with an obliquity of 41°, it was only 1° C in arrear of the air-warmth at the equator with an obliquity of only 6°.

SHADE TEMPERATURE AT OR NEAR NOON AND SEA-LEVEL.

Station.	Latitude. °	Sun's Apparent Altitude. °	Temperature. °
At Sea, April 10	45 S.	37	18·9
,, March 23	31 ,,	58	26·3
,, ,, 22	29 ,,	60	29·7
,, ,, 18	27 ,,	65	32·5
,, ,, 17	23 ,,	68	32·8
,, ,, 16	20 ,,	71	29·4
,, ,, 13	11 ,,	82	37·2
,, ,, 12	10 ,,	83	37·2
,, ,, 11	9 ,,	85	36·5
,, ,, 6	0 ,,	84	37·2
,, ,, 4	3 N.	81	30·0
,, ,, 3	5 ,,	78	29·4
,, ,, 2	8 ,,	75	31·7
,, Feb. 24	17 ,,	64	28·0
,, ,, 20	21 ,,	58	28·3
,, ,, 19	23 ,,	56	27·2
,, ,, 16	30 ,,	48	28·9
,, Jan. 27	51 ,,	21	10·6
Bellagio, Sept. 17	45 ,,	47	28·5
Oatlands Park, June 8	52 ,,	61	30·0
Isle of Wight, May 13	51 ,,	57	28·9
,, ,, ,, 14	51 ,,	58	29·0
,, ,, ,, 15	51 ,,	58	30·0
Whitby Aug. 16	54 ,,	50	32·0
Aak, Romsdal, July 15	63 ,,	49	36·2

Shortly summarised, therefore, the conditions most favourable for a genial climate—

Depending on solar intensity are—	Depending on air temperature, are—
1. Great elevation above sea-level.	1. Slight elevation above sea-level.
2. A light coloured ground and back-ground.	2. A dark coloured ground and back-ground.
3. Shelter. Reception of direct and reflected rays.	3. Shelter. Reception of direct and reflected rays.
4. A clear sun with white clouds.	4. A clear sun with white clouds.
5. A clean atmosphere. No dust, smoke, or fog.	5. A clean atmosphere. No dust, smoke, or fog.
6. A minimum of watery vapour in the air.	6. A maximum of watery vapour in the air.

Thus whilst there are three conditions common to both categories, the three remaining ones are diametrically opposed to each other.

TOWN CLIMATE.

The climate of towns depends upon the same essential conditions as that of the country, but some of these are more within our own control in towns.

The great evils of our town climate are excessive heat in summer and cheerless gloom in winter. We suffer less, however, from excessive solar intensity than continental cities between the same parallells of latitude, owing to the very causes which plunge us into a more miserable gloom in winter. Light-coloured walls neither make our streets look cheerful nor feel hot. Such sad colours as brick, stone, stucco, or paint give to our houses are soon changed to a grimy neutral tint, powerless to reflect either solar light or heat.

The darker the colour of the houses, the cooler the streets and the hotter the rooms during sunshine, and *vice versa.* Whilst the summer climate in our streets and houses is thus, to a considerable extent controllable, that of winter, which depends so much on a clean atmosphere, is still more so. All our towns are nearly

at the sea-level, a position favourable for air-, but not for sun-warmth. In our large towns, however, we artificially create an impenetrable barrier to solar radiation by throwing into the air the imperfectly burnt products of bituminous coal.

These products are of three kinds—soot, tar, and steam. Every ton of bituminous coal burnt in our grates gives off about 6 cwts. of volatile but condensable products. The less perfect the combustion the more tar and the less steam will be produced. If perfectly burnt without any smoke, then about 9 cwts. of steam, occupying 27,359 cubic feet at 100° C., or 20,024 cubic feet at 0° C. will be sent into the air. Now, 33,333 tons of bituminous coal are, on the average daily consumed in London in winter, giving 667,460,000 cubic feet of steam at 0° C.

This combustion of enormous quantities of bituminous coal acts in the production of town fog in three ways:—1st. By supplying the basis of all fog—condensed watery particles. 2nd. By determining the condensation of atmospheric moisture in the form of fog. 3rd. By coating the fog particles with tar, and thus making them more persistent.

All fogs have for their basis watery particles, and the greater part even of the suspended matters visible in a ray of electric light consists of these particles, for the air becomes nearly clear when it is heated somewhat above 100° C. [Experiment shown]. Everything therefore which increases the proportion of aqueous vapour in town air tends to produce fog. But aqueous vapour alone would probably never produce fog, for it condenses at once to large particles, which rapidly fall as rain. When, however, solid or liquid particles are present in the air, the minute spherules of fog are produced. This was first shown by Messrs. Coulier and Mascart, in 1875, and their results have since been confirmed by Mr. Aitkin. The speaker showed that air filtered through cotton wool, though afterwards saturated with moisture, produced no fog when its temperature was lowered; but as soon as a small quantity of the dusty air of the theatre was admitted fog was immediately formed, whilst, when a little coal smoke was introduced, a dense and more persistent fog was the result.

The fog once formed is rendered more persistent by the coating of tarry matter which it receives from the products of the imperfect combustion of smoky coal. The speaker had made numerous experiments on the retardation of evaporation by films of coal tar. He had found that the evaporation of water in a platinum dish placed in a strong draught of air was retarded in one experiment by 84 per cent. and in another by 78·6 per cent., when a thin film of coal tar was placed on the surfaces. Even by the mere blowing of coal smoke on the surface of the water for a few seconds, the evaporation was retarded by from 77·3 to 81·5 per cent. Drops of water suspended in loops of platinum wire were also found to have their evaporation retarded by coal smoke. Hence arise the so-called dry fogs which have been observed by Mr. Glaisher in balloon ascents, some examples of which are given in the following table:—

FOG IN COMPARATIVELY DRY AIR.

Place of Ascent.	Altitude.	Temperature of Air.	Degree of Humidity.
	Feet.	°F.	100 = saturation.
Wolverhampton	5,922	53·5	61
Crystal Palace	3,698	38·5	62
,, ,,	9,000	32·5	52
,, ,,	1,000	64·7	53
Wolverton	11,000	30·0	68
Woolwich	6,000	44·0	64
,,	4,400	42·0	52

Thus the smoke of our domestic fires constitutes a potent cause both for the generation and the persistency of town fogs. In London, at all events, if all manufacturing operations were absolutely to cease, the fogs would not be perceptibly less dense or irritating. Granting then this cause of town fogs, what are the remedies open to us? The speaker was of opinion that the substitution of a sufficient number of smoke-consuming grates (assuming a smoke-consuming grate to have been invented), for the 1,800,000 fire-places of London was quite hopeless, and that one remedy only could be of any appreciable service—*the importation of bituminous coal must be forbidden.* This is a case in which individual effort can do nothing; but State or municipal action would be simple and decisive.

There need be no fear that the price of smokeless fuel would rise inordinately, for the sources of this fuel are too numerous and inexhaustible to admit of either a monopoly or a serious rise in price. In addition to the enormous stores of smokeless coal in the Welsh coal-fields, every bituminous coal yields a smokeless coke, either in the retorts of gasworks or in coke ovens. On the average, 100 tons of smoky coal yields 60 tons of coke, the remaining 40 tons being driven off as combustible gas, ammoniacal liquor and tar; and as there is an almost unlimited demand for these products, it is not unlikely that they would, under the circumstances contemplated, repay the cost of coking, and it is worthy of note that coal of very inferior quality makes fairly good coke.

The only objection to the domestic use of smokeless coal and coke is the difficulty of lighting the fire, but this is obviated by the use of gas as proposed by Dr. Siemens. In ordinary grates, however, there is little difficulty in lighting and burning these smokeless fuels if the throat of the chimney be contracted so as to increase the draught. In this way nearly every grate in London could be rendered smokeless at an expenditure of a couple of shillings.

It is unnecessary to enumerate the many advantages of a smokeless atmosphere, but it may here be mentioned that London fogs not only seriously injure health but annually destroy the lives of thousands. In one week alone upwards of 1,100 lives have been thus sacrificed in London. We have doubtless still long to wait before the only remedy for London fogs will be adopted; but in the meantime, immunity from their effects, so far as the respiratory organs are concerned, may be obtained by the use of a small and very portable cotton-wool respirator which is made, in accordance with the speaker's directions, by Mr. Casella, of Holborn. [Respirator exhibited.] Armed with this little instrument, he had often passed through the densest and most irritating fogs with perfect immunity, breathing, in fact, all the time, air even purer than that of the country. Such a remedy is, however, obviously of extremely limited application.

In conclusion he said, though we may, with justice, complain of the scanty share of sunshine now received by us, let us not forget that, in our coal-fields, we are compensated by vast stores of the sunlight of past ages. How far through electricity, these stores can be evoked to supplement the present defective supply, he would be a bold man who would venture to predict. Let us not, however, continue to use this great legacy of light of the past to obscure the small one of the present.

SCIENTIFIC SERIALS

American Journal of Science, July.—Contributions to meteorology (seventeenth paper), by E. Loomis.—The phenomena of metalliferous vein-formation now in progress at Sulphur Bank, California, by J. Le Conte and W. B. Rising.—Modes of occurrence of the diamond in Brazil, by O. A. Derby.—On the influence of time on the change in the resistance of the carbon-disc of Edison's tasimeter, by T. C. Mendenhall.—Further observations on the crystallised sands of the Potsdam sandstone of Wisconsin, by A. A. Young.—On the origin of jointed structure, by G. K. Gilbert.—Break-circuit arrangements for transmitting clock-beats, by F. E. Nipher.—Cirriped crustacean from the Devonian, by J. M. Clarke.

Archives des Sciences Physiques et Naturelles, No. 7, June 15.—Contribution of astronomy to the solution of a problem of molecular physics, by M. R. Pictet.—Study of the variations of kinetic energy of the solar system, by MM. Pictet and Cellerier. Swiss Committee of Geological Unification, by M. Renevier.—On a characteristic of the Batatas, whose singularity in the family of the Convolvulaceæ has not been sufficiently remarked, by M. de Candolle.—Observation of Mr. Meehan on the variability of the English oak (*Quercus robur*), and remark by M. de Candolle.—Note on Echinida gathered in the environs of Camerino (Tuscany), by M. Canavari.

No. 7, July 15—On the rotatory polarisation of quartz, by MM. Soret and Sarasin.—On the diffusion of bacteria, by M. Schnetzler.—Petrogenic classification or grouping of rocks according to their mode of formation, adopted for academic instruction and for the museum of Lausanne, by M. Renevier.

SOCIETIES AND ACADEMIES

VIENNA

Imperial Academy of Sciences, July 13.—O. Tumlirz, on a method for researches on the absorption of light by